

# SPATIAL RELATIONS ALONG THE IN-ON CONTINUUM IN THAI SIGN LANGUAGE

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## Abstract

Spatial relations along the IN-ON continuum are primarily expressed in Thai Sign Language (ThSL) through classifier constructions. In these constructions, the signer articulates the lexical sign for the ground and then its classifier using his non-dominant (left) hand. The classifier is held in place while the signer uses his dominant (right) hand to articulate the lexical sign and classifier for the figure. The classifier for the figure is then placed in proximity to the classifier for the ground in a way that mirrors the spatial relation between real-world objects. Parameters of this expression can be used to identify where the relation falls along the IN-ON continuum. These parameters arise from the iconic nature of how the relation is articulated in ThSL. In addition, this iconicity allows the relation to be encoded with greater precision than similar expressions in spoken languages. Additional semantic features of the figure and ground – plurality and inherent movement – are also encoded in these constructions.

**Keywords:** Thai Sign Language, coincidence, interiority, locative expressions, spatial relations, iconicity

**ISO 639-3 code:** tsq

## 1 Introduction

This article examines the expression of spatial relations in Thai Sign Language (ThSL). Such expressions communicate the location of an object (the *figure* or *located object*) in relation to another object (the *ground* or *reference object*). This study focuses specifically on relations that involve either contact (coincidence) between the objects or containment (interiority) of the figure within the ground. It then identifies how these relations are grouped along the IN-ON continuum found in spoken languages (Bowerman 1996). The study also demonstrates the precision with which these spatial relations can be expressed and identifies semantic features of the figure and ground – plurality and inherent movement – which are overtly encoded.

Studies of spatial relations in other sign languages include research on American Sign Language, Danish Sign Language, Quebec Sign Language, Irish Sign Language, German Sign Language, and Turkish Sign Language (see Perniss 2007:80). Collins-Ahlgren (1990) also touches on the topic but focuses on comparing the function of classifiers used in locative expressions in ThSL with the function of classifiers in spoken Thai.

Finally, Eberle (2013) includes Thai Sign Language in a cross-linguistic study of locative expressions in five sign languages. Her study seeks to identify parameters of the expression of spatial relations in these sign languages that group them along the IN-ON continuum. However, based on the seven parameters investigated (e.g., contact between the articulators and type of movement employed), no grouping was identified. In light of this, the current study proposes a set of modified parameters that are based on the iconic nature of spatial relations in sign languages.

Before the expression of coincidence and interiority are explored, a brief background of Thai Sign Language is given in section 1.1, followed by an introduction to spatial relations in section 1.2. Classifiers and classifier constructions, which play a central role in expressing these relations in sign languages, are discussed in section 1.3. The methodology of the study is covered in section 1.4. In section 2 the findings of the study are presented. Section 3 reviews key findings and identifies areas for further research.

### 1.1 Thai Sign Language

Thai Sign Language is the national language of the Deaf<sup>1</sup> in Thailand. In 1997, the estimated population of profoundly deaf individuals in Thailand was 51,000 (Fennig & Simons 2018). The National Association of the Deaf in Thailand (2017) gives a more recent estimate of 300,000.

A comparison by Woodward (1996) of American Sign Language (ASL) and ThSL showed 52% lexical similarity between the languages based on a 90-word list. The lexical influence traces back to the introduction of ASL via the educational system in the early 1950s (Woodward 2003:290). ThSL also shows lexical similarity to Ha Noi Sign Language, Hai Phong Sign Language and Ho Chi Minh Sign Language (Woodward 2003:291).

As in other sign languages, ThSL signs fall along a spectrum of iconic to arbitrary. Iconic signs have clear form-meaning relationships. For instance, the sign AIRPLANE is formed by holding the hand at shoulder level, with the pinkie, pointer finger and thumb extended and the palm facing down. The pinkie and thumb represent the wings of the plane, while the pointer finger represents the nose. The location, shoulder-level, further represents the object's association with height. In contrast, signs like TAXI and SEDAN are articulated near the chest.

This iconic mapping, made possible by the visual-gestural nature of sign languages, allows for spatial relations in sign languages to be expressed with a higher level of precision than is typically found in spoken languages. However, the degree of resemblance is limited by the phonetic resources available in the language (Taub 2001:20). In sign languages, these resources primarily include the hands, face, and body of the signer. The limitations can be seen in the sign AIRPLANE where the extended pinkie and thumb are of uneven sizes, unlike the wings of a plane. They also point slightly forward, towards the “nose” of the plane, rather than slanting back like true wings. This imperfect resemblance is due to the physical limitations of the articulators. The same limitations are found in the iconic representation of spatial relations in ThSL. The nature of these spatial relations is described in section 1.2.

### 1.2 Spatial relations

Spatial relations indicate the relative position of an object, the “figure”, in relation to another object, the “ground”. These relations are divided into topological relations (e.g., *inside*, *outside*), which are true regardless of the viewer's perspective, and projective relations (e.g., *behind*, *below*), which are relative to the viewer's perspective.

Topological spatial relations include three sub-categories. First, in coincidence spatial relations, the figure and ground are in contact with one another. Second, in interiority spatial relations, the figure is contained within the area of the ground. The containment may be whole or partial. Third, in exteriority spatial relations, the figure is located outside of the area occupied by the ground. Projective spatial relations include inferiority (e.g., *under*, *below*), superiority (e.g., *over*, *above*), anteriority (e.g., *in front of*), posteriority (e.g., *in back of*) and laterality (e.g., *beside*, *between*) (Frawley 1992:254–260).

For coincidence and interiority, Bowerman (1996) identifies a cross-linguistic continuum along which these relations lie. This continuum, as given by Brala (2002:135), is shown in Table 1. It has been slightly modified for clarity.

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<sup>1</sup> In keeping with standard practice, “Deaf” is used to refer to those who identify as part of a Deaf community while “deaf” is used for the physical state.

**Table 1:** The IN-ON continuum in spoken languages

Type	Description of relation	Example
1	Support from below	<i>cup on a table</i>
2	Marks on a surface	<i>writing on paper</i>
3	Clingy attachment	<i>raindrops on window</i>
4	Hanging over/against	<i>picture on wall</i>
5	Fixed attachment	<i>handle on cupboard</i>
6	Point-to-point attachment	<i>apple on twig</i>
7	Encircle with contact	<i>ring on finger</i>
8	Impaled/spitted on	<i>apple on skewer</i>
9	Pierces through	<i>arrow in/through apple</i>
10	Partial inclusion	<i>cigarette in mouth</i>
11	Inclusion	<i>apple in bowl</i>

In Table 1, eleven types of contact along the IN-ON continuum are defined and illustrated. On one end of the continuum (type 1) are spatial relations involving support from below, such as *the cup is on the table*. On the other end (type 11) are relations involving total inclusion of the object within the ground, such as *the apple is in the bowl*. Although languages vary in how they group these spatial relations, the groupings always fall contingently along the continuum (Gentner & Bowerman 2009:470). For instance, as can be seen from the examples in the third column, English groups types 1-8 under the preposition *on* and types 9-11 under the preposition *in*. Such adpositions, however, are rarely used to express spatial relations in sign languages. Instead, classifiers and classifier constructions are utilized. These components are introduced in section 1.3.

### 1.3 Classifiers

Classifiers frequently occur in the expression of spatial relations in sign languages. For this study, classifiers are divided into two basic categories following Zwitserlood (2012:161). First, handling classifiers show how the object is held or manipulated. This type of classifier is shown in Figure 1. The image stimuli shown in the figure is from Bowerman & Pederson's *Topological Relations Picture Series* (1992), henceforth abbreviated TRPS and followed by the number of the image in the series.

**Figure 1:** Handling classifiers in ThSL (TRPS 61)

In Figure 1, two still shots from the expression *there are three handles on three cupboard doors* are shown. The frames show a handling classifier, formed by closing the hand as if grasping the handle, and then pulling it backward as if opening the cupboard. In context, this handling classifier refers back to the handle on a cupboard door.

The second group of classifiers contains whole entity classifiers. These classifiers encode semantic characteristics of an object, such as its shape, size or animacy. Two examples of whole entity classifiers are shown in Figure 2.

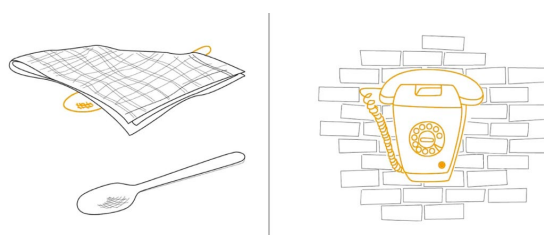
**Figure 2:** Whole entity classifiers in ThSL (TRPS 38)

In Figure 2, images from the expression *the man is seated beside the fire* are shown. In the first frame, the sign for FIRE is articulated with both hands. In Frame 2, the signer's non-dominant hand (for this signer, the left hand) has become a whole entity classifier for *fire*. Both the three-dimensional shape of the fire and its relative size (the fingers are outspread to indicate largeness) are encoded. While this classifier is held in place in Frame 2, the signer's right hand signs MAN. In Frame 3, the right hand then becomes the classifier for a person and is placed beside the first classifier. This second classifier is also a whole entity classifier, one that is primarily used for animate entities (such as people, animals, and insects).

In the final frame in Figure 2, the classifiers for the figure and ground are held in space in a way that mirrors their arrangement in the real world. Various terms have been used to refer to these constructions (see Sandler & Lillo-Martin 2006:81). Here, however, the more neutral term “classifier construction” will be used since the syntactic function of the construction is not in focus. The methodology used to identify how ThSL uses these and other components to encode spatial relations along the IN-ON continuum is discussed in section 1.4.

#### 1.4 Methodology

The expression of spatial relations along the IN-ON continuum was investigated using the *Topological Relations Picture Series* (Bowerman & Pederson 1992). The set includes 71 pictures in which the figure is identified in orange while the ground is shown in black.<sup>2</sup> Two of the images are shown in Figure 3.

**Figure 3:** TRPS image 24 (left) and 25 (right)

In Figure 3, the image on the left shows an inferiority spatial relation in which the spoon (shown in orange) is the figure, and the napkin (shown in black) is the ground. The second image shows a coincidence spatial relation in which the phone is the figure, and the wall is the ground.

The full picture series was sent to a 32-year Deaf colleague from Udonthani. He had attended Udonthani School for the Deaf before moving to Bangkok where he graduated from Ratchasuda College with a major in Technology and Educational Communication. The signer was sent the images and asked to describe the location of the objects in orange. He filmed these descriptions and sent the

<sup>2</sup> A similar set was used by Eberle (2013), but without color to distinguish the figure and ground. Instead, informants were first shown the pictures with the figure and ground sketched in black and white and asked to describe them in detail. Next, they were shown the same set of pictures with arrows pointing to the figure. Eberle (2013) provides additional discussion of her methodology and the effects of using each set of pictures.

videos back for analysis. Of the 71 videos, 46 involved contact between the figure and ground while 18 involved whole or partial containment of the figure within the space occupied by the ground. Features observed in the analysis of these videos are described in section 2.

## 2 Spatial relations in Thai Sign Language

In the data collected, lexical signs, classifiers, and classifier constructions were the primary components used to express spatial relations. On two occasions the deictic sign INDEX (pointing with an index finger) also occurred. The ways these components are combined is illustrated in section 2.1. The parameters which group these relations along the IN-ON continuum are described in section 2.2. Section 2.3 explores the precision with which ThSL expresses the spatial relations. Finally, section 2.4 identifies semantic components of the figure and ground which are overtly encoded in the data.

### 2.1 Constructions for expressing spatial relations in ThSL

In previous studies (see Perniss 2007:80), a general pattern for the expression of spatial relations in sign languages has been identified. These constructions were also found by Eberle (2013) and were further attested in the data collected for this study.

In these constructions, a lexical sign for the ground is articulated, followed by a classifier for the figure. This classifier is held in place while the lexical sign for the figure is signed. A classifier for the figure is then placed in proximity to the classifier for the ground in a way that mirrors the real-world relationship. Alternatively, the construction can omit one or both of the lexical signs and one or both of the classifiers. The basic construction (using lexical signs and classifiers for both the figure and ground) is demonstrated first. Constructions on the extreme ends—ones that use only lexical signs or only classifiers—are illustrated next.

First, prototypical constructions use lexical signs to introduce the figure and ground, then employ classifiers to indicate their relative locations. Such an arrangement is used in Figure 4.

**Figure 4:** Prototypical spatial relation construction in ThSL (TRPS 01)



In Figure 4, the clause for *the teacup is on the table* is shown. In the first and second frame, the lexical sign for TABLE occurs, followed in Frame 3 by the lexical sign for TEACUP. In the final frame, a classifier construction occurs in which the right hand forms the classifier for a teacup and is placed on the back of the left hand, which forms the classifier for the top of the table. This pattern of introducing the ground (Frames 1 and 2) and then the figure (Frame 3) with lexical signs, and then arranging them in a classifier construction (Frame 4), occurred most frequently in the data.

Alternatively, the spatial relation could be encoded using only lexical signs. This variation is illustrated in Figure 5.

**Figure 5:** Spatial relation in ThSL using only lexical signs (TRPS 04)





In Figure 5, the expression *the ribbon is on the candle* is signed. In the first frame, the lexical sign for CANDLE occurs while in Frames 2-4 the lexical sign for RIBBON is articulated. These two lexical signs form the entire construction and represent one extreme of how a spatial relation could be expressed. On the other end of the spectrum were expressions which consisted entirely of classifiers. Such a construction is shown in Figure 6.

**Figure 6:** Spatial relation in ThSL using only classifiers (TRPS 61)



Figure 6 shows the relation *three handles are on three cupboard doors*. The first frame shows a whole entity classifier for a large, long, three-dimensional object. Frames 2-4 show a second whole entity classifier for an object with two straight sides (the cupboards), which is repeated three times, first to the left, then in front of and finally to the right of the signer's head. Frame 5 shows the entity classifier for a curved, one-dimensional object (the handle). This classifier is then placed to the left (Frame 6), center (Frame 7) and then right (Frame 8) of the signer, imitating the locations of the individual cupboards. A final classifier construction (see Figure 1), opening the cupboard doors, was also used. However, this final portion seems to be for clarification and so is external to the basic construction. Whether it is included in the basic construction or not, however, the spatial relation is expressed entirely through classifiers.

Finally, the deictic sign INDEX (pointing with the index finger to a particular location) was also used twice in the data. One of these occurrences is shown in Figure 7.

**Figure 7:** Spatial relation using INDEX in ThSL (TRPS 65)



In Figure 7, the clause *here on the mountain top there is a tree* is shown. In the first two frames, the signer's right hand articulates the sign for MOUNTAIN. In the third frame, the signer uses INDEX to point to the space representing the top of the mountain. In the final frame, the lexical sign for TREE occurs in this same location, completing the expression. The addition of the sign INDEX in the third frame adds the deictic meaning *here*. However, it appears to be an optional variation of the more basic locative expression (one without deixis). This analysis is supported by the omission of INDEX in the very similar construction shown in Figure 8.

**Figure 8:** *Spatial relation without INDEX in ThSL (TRPS 17)*

In Figure 8, Frames 1-2 again show the lexical sign MOUNTAIN, followed in Frame 3 by the sign TREE. In Frame 4 the classifier for the tree (the signer's left hand) is placed against the classifier for the mountain (the signer's right hand). In this construction, the sign INDEX was not employed. It appears, then, that the construction shown in Figure 7 is a deictic variant of the more basic form shown in Figure 8.

The examples in Figures 4-8 demonstrate the range of constructions used to express spatial relations in the data collected. The most common constructions (see Figure 4) used lexical signs to introduce the ground and then the figure. Classifiers representing these entities were then positioned in relation to one another in a classifier construction. Alternatively, one or both lexical signs could be dropped, or one or both classifiers. Constructions on the extreme ends of these possibilities used only lexical signs (Figure 5) or only classifiers (Figure 6). In rare instances, a deictic variation occurred that used the sign INDEX (Figure 7). These types of constructions were used to encode both coincidence and interiority relations. The parameters used to mark these relations, and how they can be used to group ThSL spatial relations along the IN-ON continuum, are discussed in section 2.2.

## 2.2 Encoding relations along the IN-ON continuum

The IN-ON continuum is comprised of coincidence and interiority spatial relations. Coincidence involves contact between the figure and ground while interiority involves the figure being wholly or partially contained within the area occupied by the ground. Since the expression of spatial relations in sign languages is highly iconic, it is reasonable to expect an iconic means of expressing the contact and containment which characterize these relations. The presence (or absence) of these iconic parameters would then group these relations along the IN-ON continuum.

Seven potential parameters of these constructions were traced by Eberle (2013:25) in order to identify such groupings. However, none of the parameters investigated consistently grouped spatial relations along the IN-ON continuum. One reason for this may be that the definition for the parameter of contact required the hands representing the figure and ground to come into physical contact. However, it was found that by expanding this criteria to include idealized contact (which will be illustrated shortly), a consistent parameter was identified that grouped together the first ten spatial relations along the IN-ON continuum (see Table 1).

This expanded parameter was able to account for all 46 instances of coincidence in the data. The most common form of the parameter, occurring in 35 of the examples, was to use physical contact between the classifiers. Physical contact was seen in Figure 4, which is repeated as Figure 9 for ease of reference.

**Figure 9:** *Physical contact between classifiers in ThSL spatial relation (TRPS 01)*

In Figure 9, the expression *the teacup is on the table top* is again shown. The first and second frames show the lexical sign TABLE while the third frame shows the sign TEACUP. In the final frame, the signer's left hand, the classifier for the figure, comes into physical contact with the right hand, the classifier for the ground.

Physical contact between the classifiers iconically represents the contact between the objects in the real world. However, due to the limitations of the articulators, physical contact is not always possible. In these situations, the part of the entity not physically represented by the classifier is still conceptually present and is brought into idealized contact with the other object. An example of this idealized contact is seen in Figure 10.

**Figure 10:** *Idealized contact between classifiers in ThSL (TRPS 27)*



Figure 10 shows the expression *the orange grew on a branch of the tree*. The first frame shows the classifier for TREE.BRANCH. Frame 2 then shows the lexical sign ORANGE while Frames 3-4 show the orange (articulated with the signer's right hand) growing on one of the tree's branches (realized as the signer's left pinkie). The final contact shown in Frame 4 between the orange and the branch is idealized rather than physical. This idealized form is necessary since the full sphere of the orange is not replicated by the signer's right hand. However, the top of the orange is still conceptually present and comes into idealized contact with the tree branch. This type of idealized contact was used in two of the remaining 11 examples of coincidence.

The final nine examples of coincidence used shared signing space to encode idealized contact. An example of this was seen in Figure 5, which is repeated as Figure 11.

**Figure 11:** *Expressing contact through shared signing space in ThSL (TRPS 04)*



In Figure 11, only two overt constituents are used: CANDLE in Frame 1 and RIBBON in Frames 2-4. The contact between the objects is communicated through the use of shared signing space, specifically the area in front of and slightly to the left of the signer's body. Shared signing space was utilized in the remaining nine instances of coincidence.

While the instances of coincidence in Figure 10 and Figure 11 do not involve physical contact between the sign representing the figure and the sign representing the ground, the contact is still conceptually present. It is realized through idealized portions of the classifiers or establishing the objects in the same signing space. By extending Eberle's (2013) definition of contact to include these forms of idealized contact, a parameter is identified which occurred consistently with coincidence spatial relations in ThSL. This parameter occurs in all eleven relations along the IN-ON continuum (see Table 1).

By adding the parameter of containment, this grouping can be further subdivided into Types 1-8 and 9-11. First, the parameter of containment can be realized physically by inserting the classifier for



the figure into the classifier for the ground. Interiority relations in ThSL can also be grouped along the IN-ON continuum by using the parameter of physical or idealized containment of the figure within the ground. An example of physical insertion is given in Figure 12.

**Figure 12:** *Physical containment in ThSL interiority relation (TRPS 62)*



In Figure 12, the clause *the cork is in the bottleneck* is shown. In the first and second frame, the sign BOTTLE is articulated. In Frame 3, a classifier for a small object (the cork) is signed. In the fourth frame, this classifier is inserted into the classifier for the ground, which shows the neck of the bottle. The physical insertion of one classifier into the other iconically mirrors the interiority relation of the cork and bottle. Physical insertion of one classifier into the other occurred in seven of the 18 instances of interiority.

Alternatively, the conceptually present portions of the classifier could be utilized to show idealized containment, as illustrated in Figure 13.

**Figure 13:** *Idealized containment in ThSL interiority relation (TRPS 02)*



In Figure 13, the first and second frames show the sign LARGE.BOWL, followed in the third frame by the sign APPLE. In the final frame, the classifier for the apple is placed within the space pragmatically occupied by the bowl, although only one side of the bowl is physically realized by the classifier itself (the signer's left hand). The remainder of the bowl is still conceptually present. Containment was shown using conceptually present portions of classifiers in nine of the remaining 11 examples of interiority.

Finally, shared signing space was also used to show containment. In the data, this method only occurred in examples where the figure occupied negative space (e.g., a crack or hole; see Levinson & Wilkins 2006:10). An example of this is shown in Figure 14.

**Figure 14:** *Idealized containment using shared signing space in ThSL (TRPS 26)*



In Figure 14, the expression, *the cup broke and has a crack in it* is shown. In the first frame, the sign TEACUP occurs, followed by the sign BREAK in Frame 2. In the final frame, the signer traces the zig-zag shape of the break down the side of the cup. The shape is articulated in the same space used to sign the teacup, thus making iconic use of signing space to convey the interiority relation. Shared signing space was used in the remaining two examples of containment.

It is difficult to tell, without more precise measurements, if there is a distinction in how shared signing space is used to express idealized contact versus idealized containment. Since the distinction would have to be subtle, it is likely that the interpretation of the expression relies on more practical considerations. For example, it is unlikely for a ribbon to be *in* a candle (see Figure 11), and impossible for a crack to be in mere contact with a teacup (Figure 14).

When classifiers are involved in the construction, the difference is more apparent. This level of clarity is illustrated by contrasting Figure 15 and Figure 16. Both show a spatial relation between two-dimensional objects. The relations vary minimally in that Figure 15 shows a coincidence relation while Figure 16 shows an interiority relation.

**Figure 15:** *Coincidence relation in ThSL between two-dimensional objects (TRPS 03)*



Frames 1-2 of Figure 15 show the sign ENVELOPE, followed in the third and fourth frame by the sign STAMP. The final position of the sign, shown in Frame 4, is held in place to form the classifier construction for two, two-dimensional objects in contact with one another. The classifiers are not inserted into one another, thus barring an interpretation of interiority. This construction contrasts with that in Figure 16, where the classifier for the figure is minimally inserted into the classifier for the ground.

**Figure 16:** *Containment relation in ThSL between two-dimensional objects (TRPS 28)*



In Figure 16, the sign STAMP (which in this construction is the ground), is articulated in Frames 1-2. In Frame 3 a classifier for *stamp* is then shown. This classifier is held in place in Frame 4 while WOMAN is signed with the signer's right hand. In Frame 5, the classifier for the woman is inserted slightly into the classifier for the stamp, showing the containment of the figure within the ground. Thus, although the use of shared signing space may not make a sharp distinction between coincidence and interiority relations, the difference can be expressed clearly when using classifiers.

Finally, some interiority relations do not involve contact between the figure and the ground. This absence of contact is possible when the ground is conceptually hollow. An example of this type of relation is given in Figure 17.

**Figure 17:** Containment without contact in ThSL (TRPS 19)

In Figure 17, the expression *the apple is in the ring* is shown. In the first two frames, a classifier for LARGE.RING is signed. In the third frame another classifier for the ring, showing its relative size and shape, occurs. The lexical sign for APPLE is then articulated in Frame 4 while the classifier for the ring is held in place in front of the signer. In the final frame, the classifier for the apple is placed inside the hollow area of the ring. There is no physical contact between the classifiers and, because the space inside the ring is hollow, there is also no idealized contact.

Based on the data for coincidence and interiority relations in ThSL, two parameters can be identified that group these relations along the IN-ON continuum: physical or idealized contact and physical or idealized containment. These parameters can be used to distinguish three groups of relations along the IN-ON continuum, as shown in Table 2. A new category (type 12) has been added to the end of the continuum to account for spatial relations like those in Figure 17 which involve containment but not contact.

**Table 2:** Grouping of ThSL spatial relations along the IN-ON continuum

	Type of relation	Parameter for grouping
1	Support from below	[+contact]; [-containment]
2	Marks on a surface	
3	Clingy attachment	
4	Hanging over/against	
5	Fixed attachment	
6	Point-to-point attachment	
7	Encircle with contact	
8	Impaled/spitted on	
9	Pierces through	[+contact]; [+containment]
10	Partial inclusion	
11	Inclusion with contact	
12	Inclusion without contact	[-contact]; [+containment]

In Table 2, types of spatial relations along the IN-ON continuum are again listed and described. The features which identify their groupings in ThSL are given in the final column using binary ([+/-]) values. First, physical or idealized contact between the articulators is present in ThSL for spatial relation types 1-8. These constructions are [-containment] since they do not involve physical or idealized containment of the figure within the ground. In contrast, both contact and containment (physical or idealized) are present for spatial relations 9-11. Finally, relations which involve complete containment of the figure within the ground, but which lack the parameter of contact, are grouped under type 12.

These groupings and parameters align with three basic expectations. First, based on the cross-linguistic norms noted by Bowerman (1996:484) it is expected that languages will contingently group spatial relations along the IN-ON continuum. Second, based on the iconic way in which these relations are expressed in sign languages, it is expected that coincidence will be expressed iconically through contact and interiority will be expressed through containment. Finally, due to phonetic limitations of the language, the iconic resemblance will be imperfect or incomplete in some ways. The parameters of contact and containment to express coincidence and containment, respectively, align

with the first two expectations. The fact that the expression of these features are sometimes physically expressed and sometimes rely on idealized realizations is accounted for by the phonetic limitations of the expression.

The iconic nature of sign languages also allows the surfaces of the objects involved in coincidence and interiority constructions in ThSL to be precisely identified. This precision is demonstrated in section 2.3.

### 2.3 Coincidence and surface-contact specification

The salient dimensionality of both the figure and ground can be encoded in Thai Sign Language spatial relations. This encoding occurs when the forms of the objects are physically realized through classifier constructions. In these instances, the exact surfaces of the figure and ground which come into contact can be conveyed. The resulting expression allows coincidence spatial relations in ThSL to include information about the projective spatial relation (e.g., contact from above or below) of the figure and ground. This is true whether the figure and ground are one, two or three-dimensional entities. In the following examples, this is selectively demonstrated using spatial relations which involve contact between a figure and a saliently one, two and three-dimensional ground.

First, Figure 18 shows contact between the figure and a three-dimensional ground.

**Figure 18:** Contact between figure and three-dimensional ground in ThSL (TRPS 55)



Figure 18 shows the expression *the rope is coiled around the tree stump*. In the first frame, both hands are used to sign TREE. In Frame 2 the signer uses a classifier (signed with his left hand) to show the trunk, while his right hand shows that the trunk has been leveled-off. In Frame 3 ROPE is signed. Frames 4-5 show the signer's left hand resuming the classifier for *trunk* while his right hand forms the classifier for a rope and drags the classifier around the circumference of the stump classifier. This construction conveys that 1) the figure and ground are in contact (shown by the physical contact between the two classifiers) and 2) that the contact spans the circumference of the three-dimensional ground.

When a two-dimensional ground is involved, the spatial relation can express superiority or inferiority by holding the classifier with the palm facing up or down, laterality by holding the classifier with the palm facing left or right, and anteriority or posteriority by holding the classifier so that palm faces away from or towards the signer. An example from the first category is given in Figure 19.

**Figure 19:** Contact between figure and two-dimensional ground in ThSL (TRPS 59)





In Figure 19, the expression *the pencil is on the desktop* is shown. In Frame 1 the signer articulates TABLE. In Frame 2 he signs DRAWERS in the signing space under the table, modifying the meaning of the first sign to mean *desk*. In Frame 3 the signer articulates PENCIL and, in Frame 4, the classifier for the pencil is placed on the two-dimensional surface of the desk. This positioning includes the information that the pencil is lying down and that its long edge makes contact with the top, two-dimensional surface of the desk.

Finally, the figure can touch either the side or tip of a one-dimensional ground. Contact with the side of the ground is illustrated in Figure 20.

**Figure 20:** *Contact between figure and one-dimensional ground in ThSL (TRPS 56)*



In Figure 20, the expression *the flag is waving on the side of a flagpole* is shown. In the first frame, the classifier for a tall, thin object<sup>3</sup> is signed. The classifier for a two-dimensional object (the flag) is placed along the edge of the one-dimensional ground and moved upward. The inherent movement of the flag (see §2.4) is encoded in Frames 2-4 with a waving motion of the fingers. This arrangement specifies both the contact between the flag and the pole and that it is the edges of the objects that are in contact.

Figures 18-20 highlight the fact that the specific surfaces of the figure and ground that come into contact can be explicitly encoded in ThSL. This specification is possible regardless of the dimensionality of either the figure or ground. Additional features of the figure and ground – plurality and inherent movement – can also be encoded. These features are discussed in section 2.4.

## 2.4 Coincidence and characteristics of the figure and ground

When encoding the spatial relation between the figure and ground in ThSL, both the plurality of the objects and their inherent movement affect how the expression is formed. The effect of plurality was seen in Figure 6 where the plural ground CUPBOARDS and plural figure HANDLES were expressed through the repeated articulation of the classifiers. In that example, the classifiers for the ground were repeated first, with slight shifts in the signing space used each time, showing the cupboards were side by side. Next, the classifier for the figure (the handles) was repeated, again with slight shifts in the area of signing space used. This movement indicated not only the plurality of the objects but also their distribution (one handle on each cupboard). Repetition of the classifiers was triggered by the plurality of the figure and ground.

The contact between the classifiers in Figure 6 was idealized. However, the contact between the classifiers may also be physical, as shown in Figure 21.

<sup>3</sup> The classifier used in the first frame can represent a one-dimensional or two-dimensional entity, depending on context. Because the rest of the construction in Figure 20 indicates that a flag is located on the side of the object, a one-dimensional object (the pole) is indicated.



**Figure 21:** Plural objects and physical contact in ThSL (TRPS 41)

Figure 21 shows the expression *three leaves are on three branches of a tree*. In Frame 1, the classifier for a tree branch is shown. In Frame 2, the classifier is held in place, and LEAF is signed with the right hand. The plurality of the figure and ground is shown in Frames 3-5 where the classifier for a leaf is sequentially touched to three of the “branches” of the classifier for the ground. This repeated contact (expressed through either physical or idealized contact) was used whenever the figure or ground involved plural objects.

A second semantic feature which affected the expression of spatial relations in ThSL was the inherent movement of either the figure or ground. When such movement was semantically present, it was physically realized in the expression of the relation. Figure 22 provides an example involving inherent movement of the figure.

**Figure 22:** Inherent movement of the figure in ThSL spatial relation (TRPS 48)

The expression shown in Figure 22 means *the water is sprinkled on the window and running down*. The first frame shows the final sign in the phrase *square hinged window*.<sup>4</sup> In the second frame, the signer's left hand becomes the classifier for a flat, two-dimensional surface (the window) while the right hand articulates the sign WATER. The arrows in Frame 3 represent the fluttering movement of the fingers of the right hand as they move down the back of the left hand. Frame 4 shows a final verb RUNNING.DOWN. The movement involved in these last two frames encodes the inherent, trickling movement of water drops on a vertical surface.

The use of physical movement to express semantic movement is again shown in Figure 23. This construction varies from the expression in Figure 22 in two ways. First, instead of physical contact between classifiers, shared signing space is used to convey the coincidence relation. Second, instead of the figure having inherent movement, the movement reflected in the construction is inherent to the ground.

<sup>4</sup> The initial signs in the phrase describing the window, SQUARE and SWINGING.PANEL, have been omitted to simplify the example and focus on the parameter of inherent movement.

**Figure 23:** *Inherent movement of the ground in ThSL spatial relation (TRPS 11)*



In Figure 23, the expression *the sailboat is sailing on the sea* is shown. Frames 1-2 show the sign for SEA, Frame 3 shows the sign for BOAT, and Frame 4 and 5 show the classifier for a sailboat that is moved forward in a rolling motion reminiscent of a boat on the waves.

Figures 21-23 demonstrate how plurality and inherent movement of the figure or ground predictably affect the physical expression of spatial relations in ThSL. Plurality involves repeated articulation of the sign(s), while the inherent movement of the objects is portrayed through mimetic movement of the classifiers.

### 3 Conclusion

Thai Sign Language uses combinations of lexical signs, classifiers and classifier constructions in the expression of coincidence and interiority spatial relations. These relations can be grouped along the IN-ON continuum using the parameters of physical or idealized contact and containment. The occurrence of these parameters in ThSL spatial relations places them into three groups along the IN-ON continuum: spatial relations involving 1) coincidence, 2) coincidence and containment, and 3) only containment. The iconic nature of these expressions in ThSL allows for the precise encoding of which surfaces come into contact. This precision is present for figures and grounds of all dimensions. Finally, the additional semantic features of plurality and inherent movement are also overtly encoded in the construction.

Additional research may reveal further sub-groupings along the IN-ON continuum for ThSL. For example, an additional parameter may be identified that distinguishes the first six types from types 78. Ultimately, parameters based on the iconic nature sign languages may be found to distinguish each of the 12 types of relations on the continuum. In addition, further affects of imperfect iconicity, due to the phonetic limitations of the language, may be identified.

Further research and analysis remain to be done on exteriority and projective spatial relations that do not involve coincidence or containment. Such work would provide a fuller understanding of how spatial relations are expressed in Thai Sign Language.

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